EXHIBIT G

Environment Canada Environnement Canada

SCIENTIFIC ASSESSMENT TO INFORM THE IDENTIFICATION OF CRITICAL HABITAT FOR WOODLAND CARIBOU (*Rangifer tarandus caribou*), BOREAL POPULATION, IN CANADA

2011 UPDATE

Canada

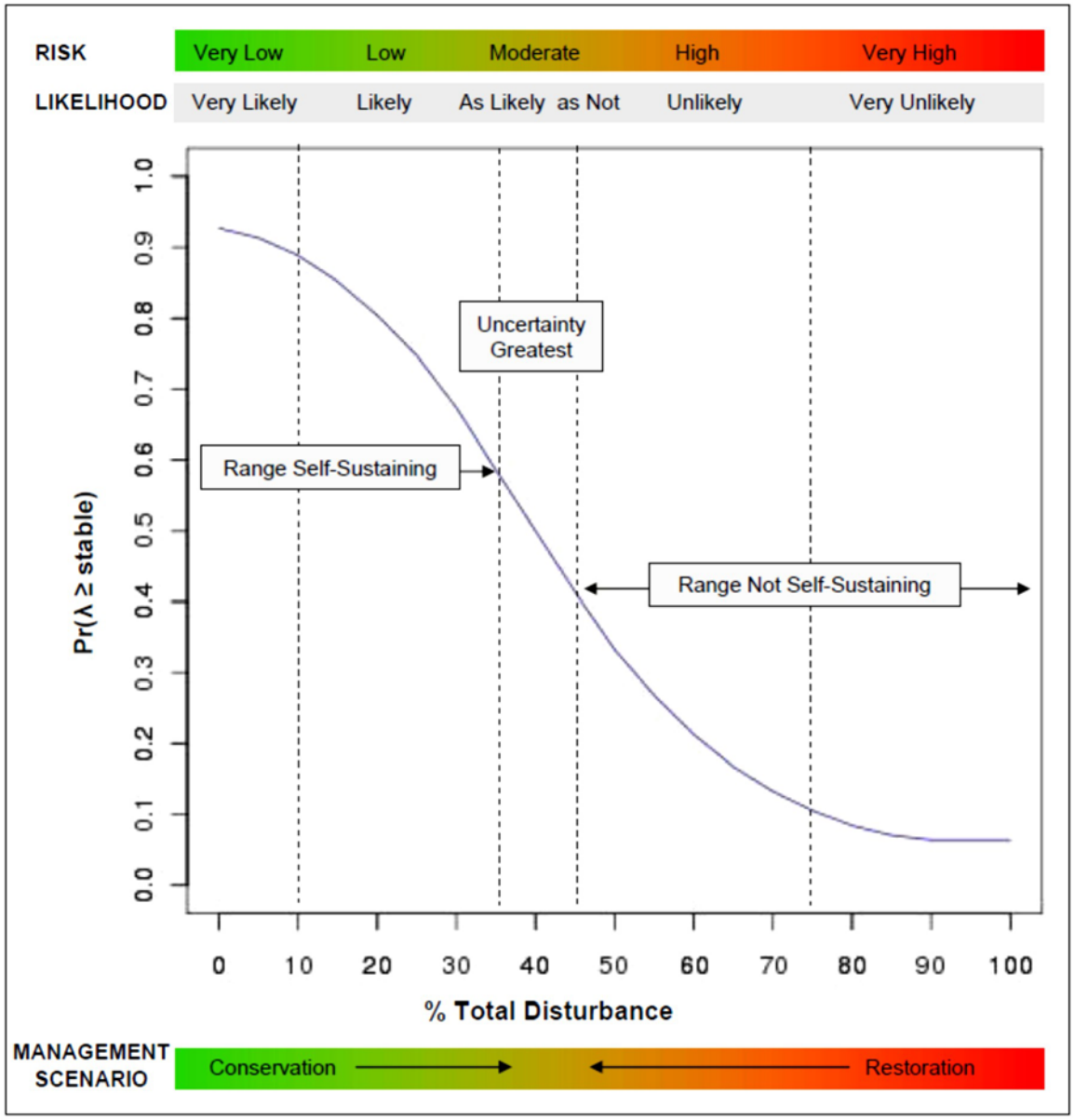


Figure 11. Probability of observing stable or positive growth ($\lambda \geq$ stable) of caribou populations over a 20-year period at varying levels of total range disturbance (fires $\leq$ 40 years + anthropogenic disturbances buffered by 500 m). Lambda (λ) was calculated using disturbance-specific recruitment values from the meta-analysis and a mean annual adult female survival rate of 0.85, consistent with other components of the critical habitat assessment (see Appendix 7.8). Certainty of outcome, ecological risk, and management scenarios are illustrated along a continuum of conditions.

The disturbance values associated with the likelihood categories for the habitat-based population growth indicator are presented in Table 9. The intervals associated with each likelihood statement reflect a range of indicator values, consistent with a probabilistic representation of certainty in outcome. Within the integrated risk assessment, an assignment of "self-sustaining" was reached when available information suggested a

3 RESULTS

The description of boreal caribou critical habitat consists in the delineation and location of the range and the certainty in range delineation (Section 3.1), the integrated range assessment (Section 3.2), information supporting the identification of disturbance-based management thresholds (Section 3.3), and a description of the key bio-physical attributes (Section 3.4). Factsheets regrouping range-specific results and supplemental information for critical habitat identification have also been developed (Appendix 7.10).

3.1 Range Delineation

Substantial changes to the delineation of boreal caribou ranges have been made since the 2008 Scientific Review, particularly in the Northwest Territories (NT), Alberta, and Ontario (Figure 13). Compared to the 2008 Scientific Review, a total of 57 ranges are still currently recognized by jurisdictions in Canada. However, significant changes occurred, with the number of ranges either decreasing (NT) or increasing (Ontario) in some jurisdictions. Table 10 summarizes the distribution of boreal caribou ranges within the 3 range delineation categories.

Based on the information provided to EC, the main changes to boreal caribou ranges in Canada since the Scientific Review 2008 are:

- Ontario: the province has identified preliminary population ranges as part of the implementation of the Ontario's Woodland Caribou Conservation Plan (OMNR n.d.). The province reported nine ranges for the update, compared to four in the Scientific Review 2008.
- Northwest Territories: Although the jurisdiction considered that boreal caribou within NT (extending into northern Alberta) consist in a large continuous population, large wildfires have occurred in the central part of the range and a recent study suggests that this discontinuity in habitat has created two, temporary isolated, subpopulations (Nagy et al. 2011). As such, the ranges of the sub-populations were used for the purpose of the current assessment.
- British Columbia: given additional information collected by the province, the Prophet and Parker ranges are no longer considered as "core" habitat, but rather a fair delineation of each local population.
- Alberta: The range known as Deadwood has been merged with the Chinchaga range. Also, various changes to existing range boundaries were made.

Table 10. Number of boreal caribou ranges in Canada within the following three delineation types: Conservation Unit, Improved Conservation Unit, and Local Population.

Range Type	Number of Ranges
Conservation Unit	18
Improved Conservation Unit	13
Local Population	26

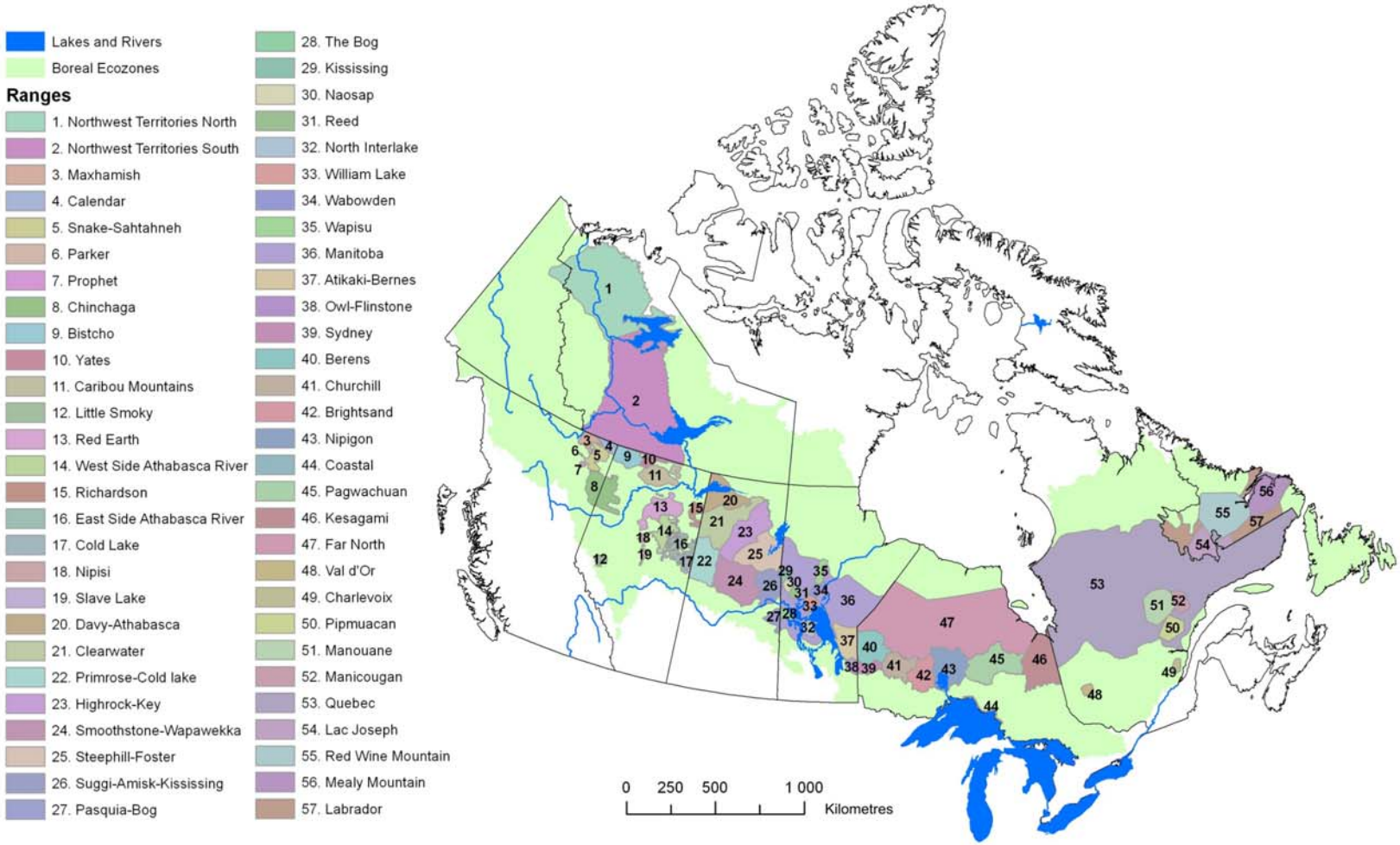


Figure 13. Boreal caribou ranges in Canada identified for the description of critical habitat.

3.2 Integrated Risk Assessment

Results obtained from applying the methodology for the risk assessment described in Section 2.4.6.1 are presented in Table 10.

Of the 57 currently delineated ranges in Canada, 17 (30%) were assessed in the "self-sustaining" (SS) category, 7 (12%) in the "not self-sustaining/self-sustaining" (NSS/SS) category, and 33 (58%) in the "not self-sustaining" (NSS) category. The repartition of likelihood statements for each self-sustaining outcome was as follow:

- For the 17 self-sustaining ranges: 3 were assigned to the "very likely", and 14 to the "likely" categories;
- For the 33 not self-sustaining ranges: 14 were assigned to the "very unlikely", and 19 to the "unlikely" categories;
- The 7 ranges assessed as NSS/SS were assigned to the "as likely as not" likelihood statement.

Results from the integrated risk assessment were also mapped in Figure 14. The distribution of the assessment outcomes demonstrates an East-West gradient of self-sustainability, with higher proportion of ranges not self-sustaining in the western portion of the caribou distribution. With the exception of Red Wine Mountain, the ranges in the eastern portion assessed as "not self-sustaining" are all in the southern limit of caribou distribution. The underlying causes include small, highly disturbed, isolated populations (Val d'Or, Charlevoix), rapid population decline (Kesagami), and high total disturbance (Sydney, Pipmuacan).

Table 11 Results for the Integrated Risk Assessment and for the supporting indicators assessing boreal caribou ranges based on two criteria of self-sustaining local population: 1) stable or positive population growth over the short term (≤ 20 years) estimated using Pr (λ ≥ stable), and 2) persistence over the long-term (≥ 50 years) estimated using the indicator of quasi-extinction (Pr (N≥Qext)).

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr (λ ≥ stable) habitat	Pr(λ ≥ stable) population	Pr (N≥Qext) [2]	Likelihood	Assessment of Self-sustainability [3]	
Northwest Territories												
1	Northwest Territories North [4]	LP	18	5	22	n/a	0.80	n/a	n/a	likely	SS	• Delineated range represents a local population range (LP) as defined by the criteria used to identify a local population range in this report. Large fires have created a discontinuity in habitat that has created a North-South divide in NT. Animals from the North have traditionally moved into the South. This divide is considered temporary until the area affected by fire regenerates. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *limited* evidence and primarily on the habitat indicator of population growth because it is the only indicator available. • Disturbance is dispersed throughout the range and a large portion originates from fire. • However, NT has detailed demographic data for study areas within the large continuous LP. For example, lambda estimates averaged over 2-3 years suggest that boreal caribou in the Gwich' in South (λ = 1.08) and Gwich' in North (λ = 1.20) study areas are experiencing positive growth (Nagy et al. 2011) consistent with risk assessment based on habitat information that the current range will likely maintain self-sustaining caribou.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
2	Northwest Territories South[4]	LP	29	10	38	n/a	0.55	n/a	n/a	As likely as not	NSS/ SS	• Delineated range represents a local population range (LP) as defined by the criteria used to identify a local population range in this report. Animals have been reported to move between NT, BC, and AB. Large fires have created a discontinuity in habitat that has created a North-South divide in NT. Animals from the North have traditionally moved into the South. This divide is considered temporary until the area affected by fire regenerates. • Current range conditions are *as likely as not* to maintain a self-sustaining population over time. The risk assessment is based on *limited* evidence and primarily on the habitat indicator of population growth because it is the only indicator available. • A large portion of the disturbance on this range is due to fire. Most of the anthropogenic disturbance is aggregated in the southern portion of the range. • However, NT has detailed demographic data for study areas within the large continuous LP. Lambda estimates averaged over 5 years suggest that boreal caribou in the Dehcho South (λ = 0.92) and Dehcho North (λ = 0.97) study areas are in decline (Larter and Allaire 2010). Lambda estimates averaged over 7 years in the South Slave (λ = 0.96) and over 5 years in the Cameron Hills (λ = 0.87) study areas are also in decline (Kelly and Cox 2011). The latter estimates suggest that the above risk assessment might be somewhat liberal, however more detailed analysis incorporating demographic data from a larger number of study areas would be necessary to ensure that the spatial variation in habitat conditions across the large continuous LP is adequately captured.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
British Columbia												
3	Maxhamish	LP	0.5	57	58	306	0.23	n/a	0.85	unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would improve the certainty in and potentially change the assessment.
4	Calendar	LP	8	58	61	291	0.21	n/a	0.84	unlikely	NSS	• Delineated range represents a LP. However, there is evidence that animals move between BC and NT and AB. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would improve the certainty in and potentially change the assessment.
5	Snake-Sahtahneh	LP	6	86	87	365	< 0.09	0.09	0.87	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • There is *high* agreement among indicators supporting the assessment outcome. The population indicator of population growth also suggests the current range will not maintain a self-sustaining population based on estimates of λ averaged over 2 years that indicate the population is in decline ($\lambda = 0.97$).

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence	Likelihood	Assessment of Self-sustainability [3]	
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]			
6	Parker	LP	0.5	34	34	25	0.63	n/a	0.31	unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *unlikely* to maintain a self-sustaining population over time based on *some* evidence. The precautionary principle is used to flag the increased risk of quasi-extinction associated with small population size (N = 25). • Poor habitat condition does not appear to represent an additive risk; the habitat indicator of population growth indicates habitat condition is sufficient to maintain a self-sustaining population. Factors contributing to the small population size should be investigated. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would improve the certainty in and potentially change the assessment.
7	Prophet	LP	0.4	79	79	54	< 0.09	n/a	0.54	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • The quasi-extinction indicator suggests an additive risk of extinction due to small population size (N=54). • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would improve the certainty and potentially change the assessment.
Alberta												
8	Chinchaga (incl. BC portion)	LP	8	74	76	250	0.10	<0.09	0.82	very unlikely	NSS	• Delineated range represents a trans-boundary LP. AB and BC coordinate monitoring and share information on caribou in this range. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on estimates of lambda averaged over the last 5 years that indicate that the population is in rapid decline (λ=0.91). • There is *high* agreement among the indicators supporting the assessment outcome. The habitat indicator of population growth also suggests that poor habitat condition is having adverse effects on the population, although this indicator produces a slightly more optimistic estimate than that based on the population indicator of population growth.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
9	Bistcho	LP	20	61	71	195	0.13	<0.09	0.78	very unlikely	NSS	• Delineated range represents a LP. However, evidence suggests that animals move between AB, NT and BC. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda averaged over the last 4 years that indicate the population is in rapid decline (λ=0.89). • There is *high* agreement among the indicators supporting the assessment outcome. The habitat indicator of population growth also suggests that poor habitat condition is having adverse effects on the population, although this indicator produces a slightly more optimistic estimate than that based on the population indicator of population growth.
10	Yates	LP	43	21	61	350	0.21	0.90	0.87	unlikely	NSS	• Delineated range represents a LP. However, there is evidence that animals move between AB and NT. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • Estimates of lambda averaged over two years suggest that the population is stable and very likely to be self-sustaining (λ = 1.02). Longer-term estimates of lambda would improve certainty in population indicator for population growth and potentially change the risk assessment.
11	Caribou Mountains	LP	44	23	57	315-394	0.23	<0.09	0.85-0.88	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda averaged over the last 5 years that indicate the population is in rapid decline (λ=0.87). • There is *high* agreement among the indicators supporting the assessment outcome. The habitat indicator of population growth also suggests that poor habitat condition is having adverse effects on the population, although this indicator produces a slightly more optimistic estimate than that based on the population indicator of population growth. A large portion of the disturbance on this range is due to fire.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
12	Little Smoky	LP	0.2	95	95	78	< 0.09	0.21	0.62	very unlikely	NSS	• Delineated range represents a LP. • This range is currently under predator management. Accordingly, the risk assessment is based on the habitat indicator of population growth that indicates the current range condition is *very unlikely* to maintain a self-sustaining population over time in the absence of active management intervention.
13	Red Earth	LP	30	44	62	172-206	0.20	<0.09	0.76-0.80	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda average over 5 years that indicate the population is in rapid decline (λ=0.86). • There is *high* agreement among the indicators supporting the assessment outcome. The habitat indicator for population growth also suggests that poor habitat condition is having adverse effects on the population, although this indicator produces a slightly more optimistic estimate than that based on the population indicator of population growth.
14	West Side Athabasca River (WSAR)	LP	4	68	69	204-272	0.13	<0.09	0.80-0.83	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda average over the last 5 years that indicate the population is in rapid decline (λ=0.92). • There is *high* agreement among the indicators supporting the assessment outcome. The habitat indicator of population growth also indicates that poor habitat condition is having adverse effects on the population, although this indicator produces a slightly more optimistic estimate than that based on population information.
15	Richardson	LP	67	22	82	150	< 0.09	n/a	0.74	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance in this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would improve the certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
16	East Side Athabasca River (ESAR)	LP	26	77	81	90-150	< 0.09	<0.09	0.65-0.74	very unlikely	NSS	• Delineated range represents a LP. Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda average over the last 5 years that indicate the population is in rapid decline (λ=0.85). • There is *high* agreement among indicators supporting the assessment outcome. The habitat indicator of population growth also suggests that poor habitat condition is having adverse effects on the population.
17	Cold Lake	LP	32	72	85	150	< 0.09	<0.09	0.74	very unlikely	NSS	• Delineated range represents a LP. However, evidence suggests that animals move between AB and SK. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *much* evidence and primarily on estimates of lambda average over the last 5 years that indicate the population is in rapid decline (λ = 0.77). • There is *high* agreement among the indicators that support the assessment outcome. The habitat indicator of population growth also suggests that poor habitat condition is having adverse effects on the population.
18	Nipisi	LP	6	66	68	55[5]	0.15	n/a	0.54	unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • The indicator of quasi-extinction suggests an additive risk of extinction due to small population size (N=55). • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.
19	Slave Lake	LP	37	63	80	65[5]	< 0.09	n/a	0.58	very unlikely	NSS	• Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence but primarily primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • The quasi-extinction indicator suggests an additive risk of extinction due to small population size (N=65). • There are insufficient available data to estimate the population indicator of population growth and to assess the additive risk of extinction due to small population size. Estimates of population growth and size would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
Saskatchewan												
20	Davy-Athabasca	CU	60	2	61	310	0.21	n/a	0.85	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.
21	Clearwater	CU	69	3	70	425	0.14	n/a	0.89	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.
22	Primrose-Cold Lake	CU	40	20	54	350	0.27	n/a	0.87	unlikely	NSS	• Delineated range represents a conservation unit. Information is available suggesting that animals move between SK and AB. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
23	Highrock-Key	CU	62	4	64	1060	0.19	n/a	0.95	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.
24	Smoothstone-Wapawekka	CU	17	20	33	700	0.66	0.37	0.94	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are u*nlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based on the population indicator of population growth that suggests the population is in decline (trend). • The habitat indicator of population growth suggests that habitat condition is likely sufficient to maintain a self-sustaining population. A large portion of the disturbance on this range is due to fire. • Factors contributing to the declining population trend should be investigated.
25	Steephill-Foster	CU	49	2	50	1075	0.33	n/a	0.95	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
26	Suggi-Amisk-Kississing	CU	18	8	25	430	0.74	n/a	0.89	likely	SS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence and primarily on the habitat indicator of population growth that suggests habitat condition is sufficient for boreal caribou. A large portion of the disturbance in this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth. Estimates of population growth would increase certainty in and potentially change the assessment.
27	Pasquia-Bog	CU	12	33	44	30	0.44	0.37	0.37	unlikely	NSS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence. The precautionary principle is used to flag the increased risk of quasi-extinction associated with small population size (N=30). • There is *partial* agreement among the indicators supporting the assessment outcome. The population indicator for population growth yielded the same risk assessment to that based on population size. The population is in decline (trend). • The habitat indicator of population size suggests that habitat condition is as likely as not to be sufficient for self-sustainability. • Factors contributing to the small population size and the declining population trend should be investigated.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
Manitoba												
28	The Bog	ICU	4	12	16	50-75	0.89	0.55	0.52-0.61	as likely as not	NSS/ SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *as likely as not* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence. The precautionary principle is used to flag the increased risk of quasi-extinction associated with small population size (N=50-75). • There is *partial* agreement supporting the assessment outcome. The population indicator of population growth yielded the same risk assessment to that based on population size. The population is stable (trend). • The habitat indicator of population growth suggests that habitat condition is likely sufficient to maintain a self-sustaining population. • Factors contributing to the small population size should be investigated.
29	Kississing	ICU	39	13	52	50-75	0.31	0.55	0.52-0.61	unlikely	NSS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is low agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • The indicator of quasi-extinction suggests an additive risk of extinction associated with small population size (N = 50-75). The reported stable population trend suggests that the current range would be as likely as not to maintain a self-sustaining population. • Discrepancy between habitat and population information should be investigated; improved estimates of population growth (lambda) would increase certainty in the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
30	Naosap	ICU	28	26	50	100-200	0.33	0.55	0.68-0.80	unlikely	NSS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. A large portion of the disturbance on this range is due to fire. • The reported trend of stable yields a more optimistic assessment, although it still suggests that the range would be as likely as not to maintain a self-sustaining population. • Discrepancy between habitat and population information should be investigated; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
31	Reed	ICU	7	20	26	100-150	0.62	0.55	0.68-0.74	likely	SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to that based on the habitat information and suggests that there is no additive risk of extinction associated with small population size. However, the reported trend of stable yields a more conservative assessment that suggests the range is as likely as not to maintain a self-sustaining population; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
32	North Interlake	ICU	4	14	17	50-75	0.87	0.55	0.52-0.61	as likely as not	NSS/ SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *as likely as not* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence. The precautionary principle is used to flag the increased risk of quasi-extinction associated with small population size (N = 50-75). • There is *partial* agreement among the indicators supporting the assessment outcome. The reported trend of stable produces a similar risk assessment to that based on the indicator of quasi-extinction. However, poor habitat condition does not appear to represent an additive risk; the habitat indicator of population growth indicates habitat condition is sufficient to maintain a self-sustaining population. • Factors contributing to the small population size should be investigated; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
33	William Lake	ICU	24	10	31	25-40	0.63	0.55	0.31-0.46	unlikely	NSS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based on the increased risk of quasi-extinction associated with small population size (N = 25-40). • The habitat information and reported trend of stable yields more optimistic assessments, although these two types of information do not yield the same results. Poor habitat condition does not appear to represent an additive risk; the habitat indicator of population growth indicates habitat condition is sufficient to maintain a self-sustaining population. The reported stable population trend suggests that the range is as likely as not to maintain a self-sustaining population. • A large portion of the disturbance on this range is due to fire. • Factors contributing to small population size should be investigated; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
34	Wabowden	ICU	10	19	28	200-225	0.63	0.55	0.80-0.81	likely	SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence and primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to the habitat indicator for population growth. However, the reported trend of stable produces a more conservative assessment that indicates the population is as likely as not to be self-sustaining. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
35	Wapisu	ICU	10	14	24	100-125	0.83	0.55	0.68-0.70	likely	SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to the habitat indicator for population growth. However, the reported population trend of stable produces a more conservative assessment that indicates the population is as likely as not to be self-sustaining. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr (N≥Qext)[2]	Likelihood	Assessment of Self-sustainability[3]	
36	Manitoba	CU	22	8	28	775-1585	0.70	0.55	0.94-0.97	likely	SS	• Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to the habitat indicator of population growth. However, the reported population trend of stable produces a more conservative assessment that indicates the population is as likely as not to be self-sustaining. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment. • Averaging habitat conditions over a large continuous area may mask spatial variation in disturbance. A large portion of the disturbance on this range is due to fire. Disturbance created by fire is dispersed across the range. Anthropogenic disturbance is also dispersed across the range with a higher concentration in the western versus eastern portion of the range.
37	Atikaki-Berens	ICU	32	5	35	300-500	0.61	0.55	0.85-0.91	likely	SS	• Delineated range represents an improved conservation unit. Available information suggests that animals move between MB and ON (Berens range). Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence primarily on the habitat indicator of population growth that suggests habitat condition is sufficient to maintain caribou. A large portion of the disturbance on this range is due to fire. • There is *partial* agreement among the indicators supporting the outcome assessment. The indicator of quasi-extinction produces a similar assessment to that based on the habitat information and suggests that there is no additive risk of extinction associated with small population size. However, the reported trend of stable produces a slightly more conservative assessment that suggests the population is as likely as not to be self-sustaining. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
38	Owl-Flinstone	LP	25	18	39	78	0.52	0.55	0.62	as likely as not	NSS/ SS	• Delineated range represents a LP. • Current range conditions are *as likely as not* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. A large portion of the disturbance on this range is due to fire. • There is *high* agreement among the indicators supporting the assessment outcome. The population indicator of population growth produces a similar risk assessments to that based on habitat information. The population is reported as stable (trend). • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
Ontario												
39	Sydney	ICU	28	33	58	n/a	0.23	n/a	n/a	unlikely	NSS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indictor available for this range. • There are insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size; estimates of population growth and size would increase certainty in the assessment.
40	Berens	ICU	34	7	40	n/a	0.52	n/a	n/a	as likely as not	NSS/ SS	• Delineated range represents an improved conservation unit. • Available information suggests that animals move between ON and MB (Atikaki-Berens range). Range boundaries may change with additional information. • Current range conditions are *as likely as not* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indicator available for this range. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size; estimates of population growth and size would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
41	Churchill	ICU	6	28	31	n/a	0.67	n/a	n/a	likely	SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indicator available for this range. • There are insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size; estimates of population growth and size would increase certainty in and potentially change the assessment.
42	Brightsand	ICU	18	28	42	n/a	0.46	n/a	n/a	as likely as not	NSS/ SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *as likely as not* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indicator available for this range. • There are insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size; estimates of population growth and size would increase certainty in and potentially change the assessment.
43	Nipigon	LP	7	25	31	300	0.67	0.55	0.85	likely	SS	• Delineated range represents a LP. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to that based on the habitat information and suggests that there is no additive risk of extinction associated with small population size. However, the reported stable trend for population growth produces a more conservative assessment that suggests the population is as likely as not to be self-sustaining; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
44	Coastal	CU	0	16	16	492	0.87	n/a	0.90	likely	SS	• Delineated range represents a conservation unit consisting of 3 occupied islands and shorelines including Pukaskwa Park. Range delineation is currently being refined. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *some* evidence but primarily on the habitat indicator of population growth and is supported by the indicator used to assess the increased risk of quasi-extinction associated with small population size. • Estimates of population growth would increase certainty in and potentially change the assessment.
45	Pagwachuan	ICU	0.9	26	27	n/a	0.72	n/a	n/a	likely	SS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indicator available. • There are insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size. Estimates of population growth and size would increase certainty in and potentially change the assessment.
46	Kesagami	ICU	3	36	38	492	0.54	<0.09	0.90	very unlikely	NSS	• Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based on estimates of lambda averaged over 1998-2001 that suggest the population in rapid decline ($\lambda = 0.88$). • Poor habitat condition does not appear to be contributing to the rapid population declines. The habitat indicator of population growth suggests that the habitat condition is *as likely as not* to support a self-sustaining population. • Factors contributing to population decline should be investigated.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
47	Far North	CU	14	1	15	n/a	0.88	n/a	n/a	likely	SS	• Delineated range represents a conservation unit. Range delineation is currently being refined. • Current range conditions are *likely* to maintain a self-sustaining population. The risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth. • There is insufficient available data to estimate the population indicator of population growth and the additive risk of quasi-extinction associated with small population size; estimates of population growth and size would increase certainty in the assessment. • Averaging habitat conditions over a large continuous area may mask spatial variation in disturbance. Fire is the predominant disturbance type within the range. Fires affect and are dispersed over the western portion of the range.
Quebec												
48	Val d'Or	LP	0.1	60	60	30	0.21	0.37	0.37	unlikely	NSS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a LP. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • There is *high* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to that based on the habitat information and suggests that there is an additive risk of extinction associated with small population size (N = 30). Similarly, the reported declining trend also suggests the current range is not self-sustaining. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

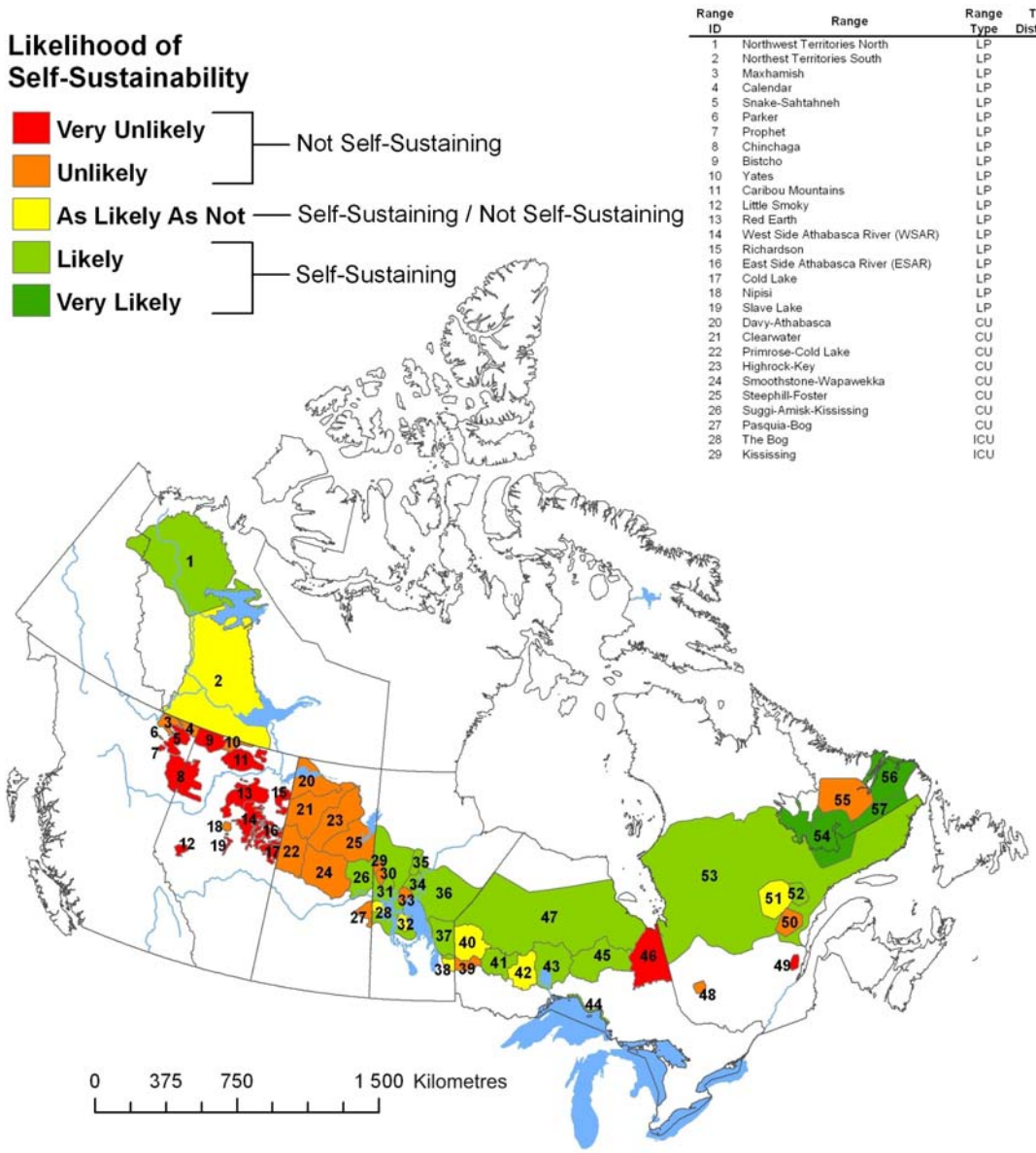
Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
49	Charlevoix	LP	4.0	77	80	75	< 0.09	0.55	0.62	very unlikely	NSS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a LP. • Current range conditions are *very unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • The reported stable population trend estimate produces a more optimistic assessment that the population is as likely as not to be self-sustaining; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
50	Pipmuacan	ICU	11.1	51	59	134	0.22	0.55	0.71	unlikely	NSS	• No updated demographic information was provided for this risk assessment. • Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *unlikely* to maintain a self-sustaining population. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the habitat indicator of population growth that suggests poor habitat condition is having adverse effects on the population. • The reported stable population trend estimate produces a more optimistic assessment than that based on the habitat indicator of population growth that suggests the population is as likely as not to be self-sustaining; improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
51	Manouane	ICU	17.9	23	39	358	0.53	0.55	0.87	as likely as not	NSS/ SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *as likely as not* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *high* agreement among the indicators that supporting the assessment outcome. The reported stable trend produces a similar assessment to that based on the habitat indicator of population growth • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.
52	Manicouagan	ICU	3.2	32	33	181	0.66	0.71	0.77	likely	SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents an improved conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *high* agreement among the indicators that the current range will maintain a self-sustaining population. The reported stable trend produces a similar assessment to that based on the habitat indicator of population growth. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
53	Quebec	CU	19.9	12	30	9000	0.68	0.55	1.00	likely	SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to that based on the habitat information and suggests that there is no additive risk of extinction associated with small population size. However, the reported trend of stable yields a more conservative assessment that suggests the range is as likely as not to maintain a self-sustaining population. • Improved estimates of population growth (lambda) would increase certainty in and potentially change the assessment. • Averaging habitat conditions over a large continuous area may mask spatial variation in disturbance. Disturbance created by fire is dispersed across the range. The majority of anthropogenic disturbance is aggregated in the southern portion of this range.
Labrador (Newfoundland)												
54	Lac Joseph	LP	7.3	1	8	1101	0.90	n/a	0.95	very likely	SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a LP. • Current range conditions are *very likely* to maintain a self-sustaining population over time. This risk assessment is based on *limited* evidence but primarily on the habitat indicator of population growth. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth; estimates of population growth would increase certainty in and potentially change the assessment.

Reference #	Range	Range Type [1]	Disturbance			Population size	Indicator of the range capacity to maintain a self-sustaining population			Integrated Risk Assessment		Notes on interpretation
							Stable or Positive Population Growth		Persistence			
			Fire (%)	Anthropogenic (%)	Total non-overlapping (%) buffered		Pr ($\lambda \geq$ stable) habitat	Pr($\lambda \geq$ stable) population	Pr ($N \geq Qext$)[2]	Likelihood	Assessment of Self-sustainability[3]	
55	Red Wine Mountain	LP	5.1	3	8	97	0.90	0.37	0.67	unlikely	NSS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a LP. • Current range conditions are *unlikely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence, but there is *low* agreement among the indicators. The precautionary principle was applied to resolve the discrepancy between habitat and population data. The risk assessment is based primarily on the population indicator of population growth that suggests the population is declining (trend). • Poor habitat condition does not appear to be contributing to the population decline; the habitat indicator of population growth suggests that habitat condition is sufficient to maintain a self-sustaining population. A large portion of the disturbance on this range is due to fire. • Factors contributing to population decline should be investigated.
56	Mealy Mountain	LP	0.4	1	2	2106	0.91	0.55	0.98	very likely	SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a LP. • Current range conditions are *very likely* to maintain a self-sustaining population over time. The risk assessment is based on *considerable* evidence but primarily on the habitat indicator of population growth. • There is *partial* agreement among the indicators supporting the assessment outcome. The indicator of quasi-extinction produces a similar assessment to the habitat indicator for population growth. However, the reported population trend of stable produces a more conservative assessment that indicates the population is as likely as not to be self-sustaining. • Longer-term estimates of λ would increase certainty in and potentially change the assessment.
57	Labrador	CU	6.5	2	9	n/a	0.90	n/a	n/a	very likely	SS	• No updated demographic information was provided for this risk assessment. • Delineated range represents a conservation unit. Range boundaries may change with additional information. • Current range conditions are *very likely* to maintain a self-sustaining population over time. The assessment is based on *limited* evidence but primarily on the habitat indicator of population growth because it is the only indicator available. A large portion of the disturbance on this range is due to fire. • There are insufficient available data to estimate the population indicator of population growth and the indicator of quasi-extinction; estimates of population growth and population size would improve the certainty in and potentially change the assessment.

1. Range type as per Figure 4: CU: Conservation Unit; ICU: Improved Conservation Unit; LP: Local Population.
2. This column reports on the indicator of quasi-extinction used to flag the increased risk of extinction associated with small population size. This indicator is estimated using range-specific population sizes and assuming good demographic conditions (stable growth), i.e., isolating the effect of population size on persistence. No quasi-extinction estimate was calculated in the absence of population size data.
3. Categories for the assessment of self-sustainability include: SS: Range Self-Sustaining; NSS: Range Not Self-Sustaining; NSS/SS: Range as likely to be Self-Sustaining as Not Self-Sustaining.
4. The jurisdiction recognizes Northwest Territories North and South as two subpopulations based on Nagy et al. (2011), and estimates a total population size in the NT of 6500.
5. The ratio between the population sizes for Nipisi and Slave Lake reported in the 2008 EC scientific review were used to derive updated population size estimates for each range from the 2010 estimate of 120 boreal caribou for both ranges combined (ASRD & ACA 2010).



Range ID	Range	Range Type	Total % Disturbance	Range ID	Range	Range Type	Total % Disturbance
1	Northwest Territories North	LP	22	30	Naosap	ICU	50
2	Northest Territories South	LP	38	31	Reed	ICU	26
3	Maxhamish	LP	58	32	North Interlake	ICU	17
4	Calendar	LP	61	33	William Lake	ICU	31
5	Snake-Sahtahneh	LP	87	34	Wabowden	ICU	28
6	Parker	LP	34	35	Wapisu	ICU	24
7	Prophet	LP	79	36	Manitoba	CU	28
8	Chinchaga	LP	76	37	Atikaki-Berens	ICU	35
9	Bistcho	LP	71	38	Owl-Flinstone	LP	39
10	Yates	LP	61	39	Sydney	ICU	58
11	Caribou Mountains	LP	57	40	Berens	ICU	39
12	Little Smoky	LP	95	41	Churchill	ICU	31
13	Red Earth	LP	62	42	Brightsand	ICU	42
14	West Side Athabasca River (WSAR)	LP	69	43	Nipigon	LP	31
15	Richardson	LP	82	44	Coastal	CU	16
16	East Side Athabasca River (ESAR)	LP	81	45	Pagwachuan	ICU	27
17	Cold Lake	LP	85	46	Kesagami	ICU	38
18	Nipisi	LP	68	47	Far North	CU	15
19	Slave Lake	LP	80	48	Val d'Or	LP	60
20	Davy-Athabasca	CU	61	49	Charlevoix	LP	80
21	Clearwater	CU	70	50	Pipmuacan	ICU	59
22	Primrose-Cold Lake	CU	54	51	Manouane	ICU	39
23	Highrock-Key	CU	63	52	Manicouagan	ICU	33
24	Smoothstone-Wapawekka	CU	33	53	Quebec	CU	30
25	Steephill-Foster	CU	50	54	Lac Joseph	LP	8
26	Suggi-Amisk-Kississing	CU	25	55	Red Wine Mountain	LP	8
27	Pasquia-Bog	CU	44	56	Mealy Mountain	LP	2
28	The Bog	ICU	16	57	Labrador	CU	8
29	Kississing	ICU	51				

LP = Local Population
CU = Conservation Unit
ICU = Improved Conservation Unit

Figure 14. Integrated Risk Assessment for boreal caribou ranges in Canada. Self-sustainability outcomes (i.e., self-sustaining, not self-sustaining, or not self-sustaining/self-sustaining) for each range were assigned based on the likelihood statement describing the range's capacity to maintain a self-sustaining local population of boreal caribou.

3.3 Assessment of Risk and Identification of Management Thresholds

The methodology described in Section 2.4.6.2 was implemented for a sample of ranges to demonstrate the potential application and interpretation of a risk-based framework to support recovery planning, including but not limited to the use of management thresholds. As indicated in Section 2.4.6.2 the consideration of management threshold is informed by science but determined by managers in accordance with decisions regarding the acceptable level of risk. To illustrate the approach, the level of acceptable risk necessary for threshold determination was set concordant with the probability interval from the integrated risk assessment associated with a likely outcome, which corresponds to the weight of evidence indicating that a range was *likely* to support a self-sustaining population, and interpreted as relatively low risk (see Figure 11). The interval includes a range of estimated probabilities from greater or equal to 60 to 90%, corresponding to a total range-level disturbance values from 10 to 35%, inclusive of a 500 m buffer on all anthropogenic disturbances. The upper end of the disturbance interval was imposed as the "*disturbance threshold*" for demonstration purposes (Figure 15).

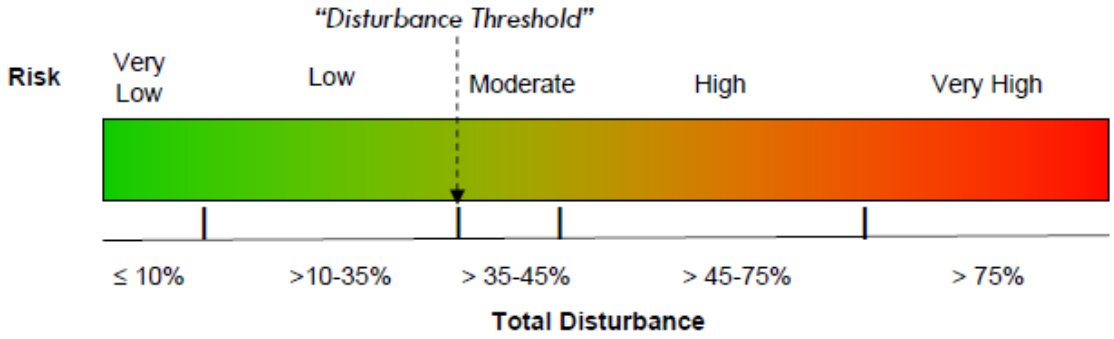


Figure 15. Intervals of disturbance reflecting relative levels of risk associated with achieving a desired outcome of maintaining range conditions necessary to support a self-sustaining population of boreal caribou. The assignment of "Disturbance Threshold" is for illustrative purposes only.

Three caribou ranges were evaluated using the stepwise approach summarized in Figure 12: West-side Athabasca River, Alberta; Smoothstone-Wapawekka, Saskatchewan, and North Interlake, Manitoba.

West-side Athabasca River: Alberta

At 69% total disturbance (Figure 16a), this range falls in the high risk category and is unlikely to support a self-sustaining population based on habitat condition. This level of disturbance is also well in excess of the "*disturbance threshold*". The reported average population trend over five years is rapidly declining ($\lambda = 0.92$; last reported value 0.78). While the reported population size of 204-272 indicates high potential for persistence, given a low risk of quasi-extinction under good habitat and population conditions (Pr ($N \geq Qext$) = 0.80-0.83), the projected quasi-extinction risk based on current population and habitat conditions indicates the population is highly unlikely to persist over the next 50 years.

Assessment of potential future scenarios (Figure 16b) indicates some potential for the range condition to improve through passive recovery of presently disturbed areas. However, it could take between 51 and 100 years for the range to recover to a condition consistent with the low risk category (also for illustrative purposes, the disturbance threshold), assuming no new anthropogenic or natural disturbances. Given the very high risk of local extirpation under current conditions, and natural recovery rates that are insufficient to offset short term extinction risk, the management scenario for this population suggests that active recovery efforts are required to reduce risk.

Monitoring of population condition should continue to assess response to recovery actions and associated changes in range condition.

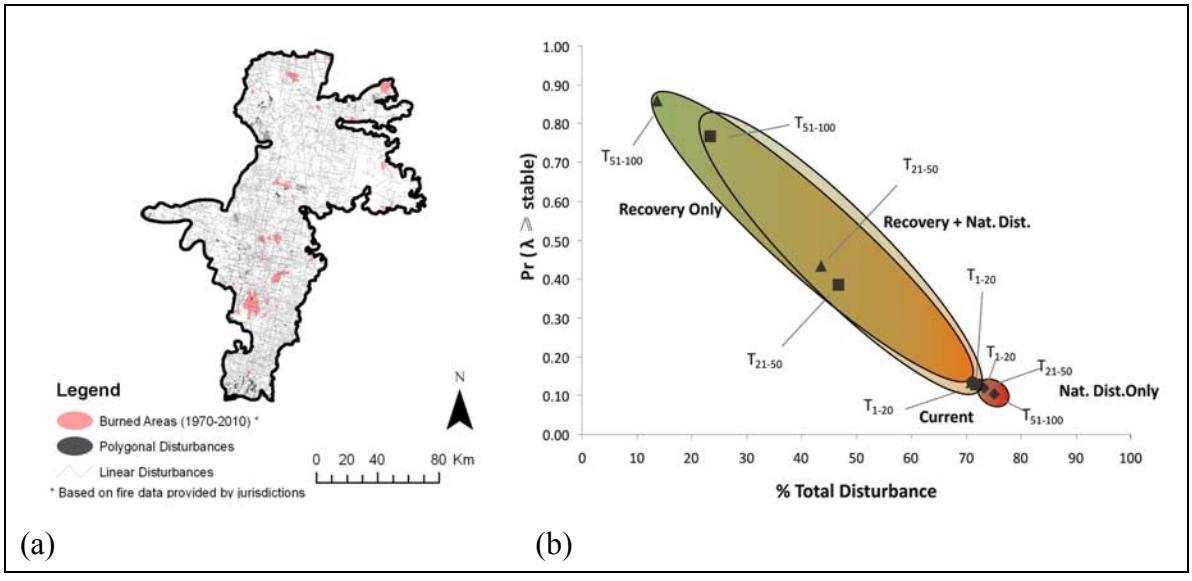


Figure 16. Current disturbance (a) and potential future population and range conditions (b) on the West-side Athabasca River caribou range.

Smoothstone–Wapaweka: Saskatchewan

At 33% total disturbance (Figure 17a), the range falls in the low risk category, which suggests it is likely to support a self-sustaining population based on habitat condition. The "*disturbance threshold*" has not been surpassed. However, the reported population trend is "declining". In addition, while the reported population size of 700 indicates a very low risk of extinction under good habitat and population conditions (Pr(N≥Qext) = 0.94), the projected quasi-extinction risk inferred from population trend under the observed habitat conditions is estimated at 0.38, indicating that the population faces high risk, and is unlikely to persist above a critical number of 10 individuals if current conditions are maintained. Visual inspection of mapped disturbance on the range (Figure 19a) suggests the highly dispersed nature of the disturbance, in conjunction with significant water bodies (not illustrated here), have contributed to a paucity of large, undisturbed areas within the range.

Assessment of future scenarios (Figure 17b) indicates potential for range condition to be improved within the low risk category through passive recovery of presently disturbed areas, 17% of which (47% of the total) consist of recent burns (≤ 40 years). While the likelihood of persistence is low if current conditions were maintained, natural recovery appears sufficient to offset short term extinction risk, assuming other threats are managed. Although the range is currently below the "*disturbance threshold*", the management scenario for this population is for conservation of remaining undisturbed habitat, to avoid increases in risk.

Monitoring should be implemented to confirm expected improvements to population condition in association with recovery of disturbed areas.

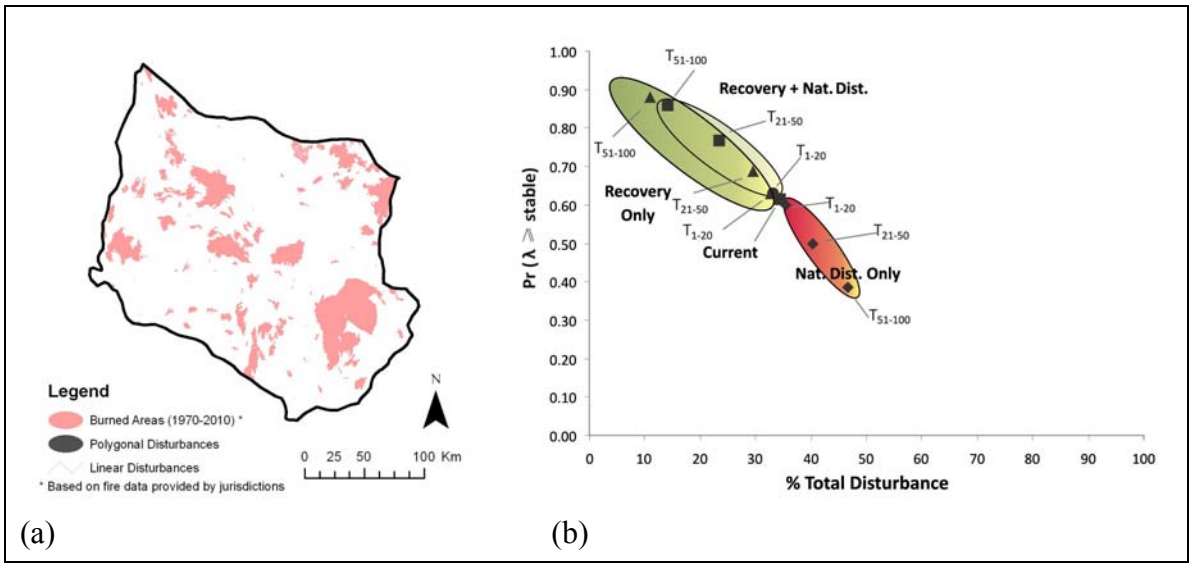


Figure 17. Current disturbance (a) and potential future population and range conditions (b) on the Smoothstone-Wapawekka caribou range.

North Interlake: Manitoba

At 17% total disturbance (Figure 18a), the range falls in the low risk category, which suggests it is likely to support a self-sustaining population based on habitat condition. The "*disturbance threshold*" has not been surpassed. However, the reported population size of 50-75 indicates a moderate risk of local extinction under good habitat and population conditions (Pr (N≥Qext) = 0.52-0.61), due to small population size.

Assessment of future scenarios (Figure 18b) indicates that range condition is likely to remain within the low risk category. The likelihood of persistence will remain uncertain and continue to represent moderate risk unless population size increases. Although the range is currently below the "*disturbance threshold*", the risk associated with the small population size suggests a cautious management approach to consideration of additional disturbance to avoid increasing risk. The location of the range on a peninsula, surrounded by water on 3 sides (not illustrated here) suggests isolation that also contributes to risk.

Monitoring should be implemented to confirm population condition and evaluate response to any changes within the range.

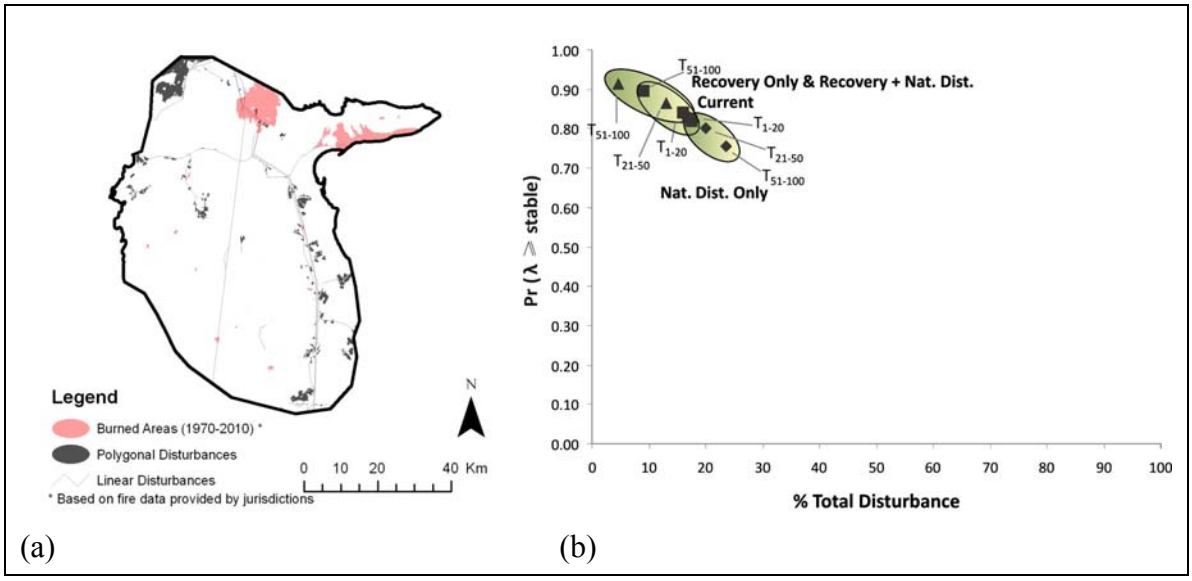


Figure 18. Current disturbance (a) and potential future population and range conditions (b) on the North Interlake caribou range.

For purposes of illustrating application of the risk-based framework to thresholds interpretation, it was necessary to assign a disturbance-based management threshold. It is clear from the examples presented that there is considerable utility in the systematic approach to building on the integrated risk assessment to more fully interpret potential outcomes and guide recovery planning, through enhanced understanding of range-specific attributes. This is an objective process that does not require the determination of management thresholds. However, application of disturbance-based management

thresholds provides specific direction relative to management objectives and acceptable risk.

In the examples presented, the disturbance threshold was commensurate with the disturbance interval representing a likely outcome with respect to maintaining a self-sustaining population. The selection of higher or lower thresholds would have different interpretations with respect to likelihood of achieving the recovery objective. The results also suggest there may be considerable value in identifying graduated thresholds, to support a variety of conservation and restoration actions given different management scenarios and range-specific circumstances. Indiscriminate application of a single, fixed threshold may not achieve desired outcomes, particularly in the absence of range-specific interpretation.

3.4 Biophysical Attributes Necessary for the Survival and Recovery of Boreal Caribou across their Distribution in Canada

Table 12. Biophysical attributes of boreal caribou habitat in the Taiga Shield ecozone.

Scale of selection	Description
Broad scale	Upland tundra dominated by ericaceous shrubs (*Ericaceae* spp.), lichen, grasses and sedges. Lowland tundra composed of peatland complexes (muskeg and string bogs), lakes, rivers and riparian valleys. Dense mature conifer and open conifer forests with abundant lichens.[1, 2]
Calving	String bogs, treed bogs, small open wetlands (<1 km^2) and large muskeg.[1, 3] Calving on peninsulas and islands increases with amount of open water. [1, 4]
Post-calving	Forested wetlands. [1]
Rutting	Open wetlands. [1]
Winter	Forested areas are used in years of low snow accumulation, otherwise winter habitat selection reflects general avoidance of deep snow, including use of tundra habitat at higher elevations in mountainous regions and bogs along lakes or oceans.[5, 6] Forested wetlands. [6] Tundra uplands and sand flats in proximity to water. [6] Bog edges, glacial erratics and bedrock erratics with lichen, and lakes for loafing or ruminating. [4, 6, 7] Some use of mature white spruce and fir stands as alternative to habitat with arboreal lichens. [8]
Travel	Connectivity between selected habitat types important given reported patterns of movement among caribou. Some females travel 200 to 500 km from winter areas to calving sites. [1] Females show fidelity to post-calving sites returning to within 6.7 km of a given location in consecutive years. [8]
Avoidance	Avoidance of roads and areas recently burned (< 40 yrs). [9]

1. Brown et al. (1986); 2. Courtois et al. (2004); 3. Brown and Theberge (1985); 4. Schmelzer et al. (2004); 5. Brown and Theberge (1990); 6. Schmelzer et al. (2004); 7. I. Schmelzer (pers. comm.); 8. Schaefer et al. (2000); 9. Appendix 7.3.